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ABSTRACT

This document suggests that the activity described can be used from kindergarten through adulthood. The activity involves measuring, counting, categorizing, group processes, construction of computer data base files, construction and/or use of data tables, data gathering, making observations, the study of shape, the computation of area, the computation of volume, the manipulating and printing of computer files and the evaluation of data trends. For older students and adults, writing skills and/or scientific writing may be added to the list. One goal of the activity is to illustrate how easily computers can be integrated into a science program. The activity uses rulers, a random collection of buttons, and the AppleWorks database. After gathering as much data as possible in some organized fashion, students work individually on the computer. Once the data gathering phase has been completed, a computer data base file is built, data entered in the file and the data base manipulated as data trends are sought. Instructions for the construction of the data base are attached, comprising three-fourths of the paper. (PK)

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BUTTONS, COMPUTERS AND DATA BASE

INTEGRATING COMPUTERS INTO SCIENCE PROGRAMS

USING APPLEWORKS

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SE 049 706

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INTRODUCTION

Whether in our teaching we apply the theories of Piaget, Gagne, use the strategies manifest in John Dewey's now very well known statement, "learn by doing, " or are eclectic as I am, life is integrated both horizontally and vertically, not divided into discrete, neat little boxes. As we plan our school days, therefore, our own backgrounds tell us that new experiences are perhaps better understood when they are concrete, we have actually participated in the experiences, they take into account all factors involved even though several disciplines may be involved and are repeated from time to time with increasing degrees of sophistication. The activity discussed here could be used in kindergarten. I present it in workshops to show teachers how easily computers can be integrated into a science program. In this indeavor, which has proved highly successful, teachers actually conduct the activity as would their students. In the activity I use rulers, buttons, Apple IIe or GS computers and the AppleWorks data base subprogram. Apple computers are used since there is a vast array of educational software compatible with them. The AppleWorks program is used because it was not specifically designed for use in science and is used by many school teachers and administrators as an administrative tool and, therefore, readily available. Let's look at the activity.

PRESENTATION

The activity can be used from kindergarten through adulthood, involves, measuring, counting, categorizing, group process, construction of computer data base files (thus computer literacy), construction and or use of data tables, data gathering, making observations, the study of shape for kindergarteners, the computation of area, the computation of volume, the manipulating and printing of computer files and the evaluation of data trends. For older students and adults, writing skills and or scientific writing may be added to the list. At this point, I need to say a word about the group process since it is used in this activity, kindergarten through adulthood. Group process is simply working together in research teams to solve a problem, answer a perplexing question or reach a goal, a technique used so very well these days in Japanese society. A second note needs to be made about the lower grades. Here, we find students starting to learn much about the scientific method as they categorize blocks by color, shape and size. As they grow older the way in which items are categorized becomes more sophisticated as data trends and the like are sought. Students, on their own, conclude that the blocks may fit into different catregories like area, volume, thickness, texture and so on.

This activity uses a random collection of buttons. Since finger dexterity is still developing with young children, you may want to use larger buttons and or stay with blocks for kindergarten and first graders. After investigating the problem, that is, gathering as much data as possible in some organized fashion (the organization again varies with age, experience of each student, background of the teacher and the collective experience of each research team) students work individually on the computer. Organization may mean, teacher making a list on the chalk board to very sophisticated tables like the one included at the end of this article. Once the data gathering phase has been completed, a computer data base file is built, data entered in the file and the data base manipulated as data trends are sought. Instructions for the construction of the data base are included at the end of the article.

Teachers who wish to have their students derive the volume of each button should use the water emersion technique. With this procedure, each button is submerged in a known volume of water as follows. A graduated cylinder is filled to a specific level, say 50 milliliters, after a weight like a washer or fishing sinker has been placed in the cylinder {tie a piece of thread to the weight so you will be able to retrieve it from the cylinder}. The volume is recorded. Then, one end of a piece of thread is tied to the sinker and the other end to the button. Tie a second piece of thread to the button. This second piece of thread is used to lower the sinker-button combination in and out of the graduated cylinder (see Figure 1). A larger graduated cylinders may be needed if extremely large buttons are used.

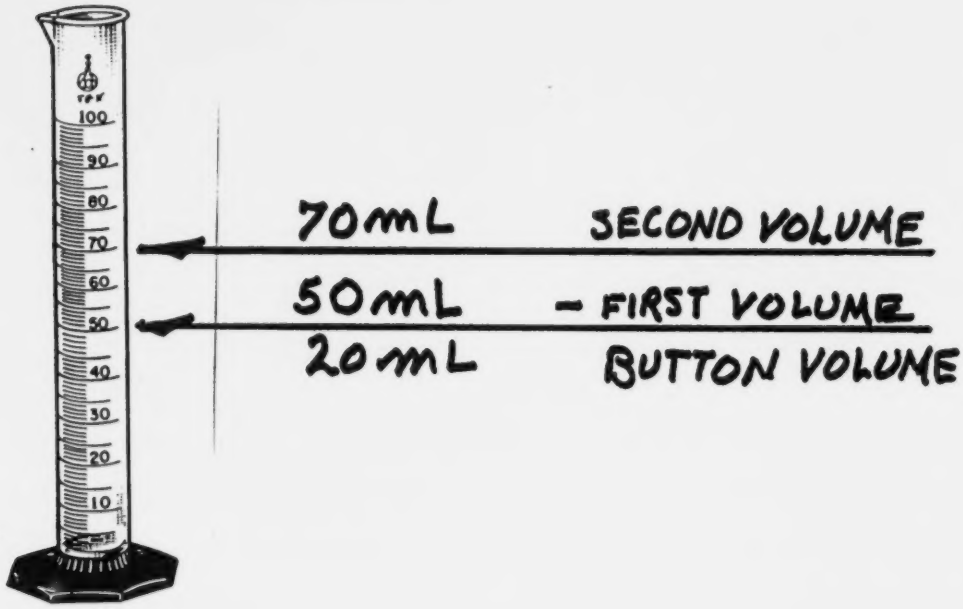

Figure 1. A Graduated Cylinder, Submersion Weight And A Button.

Now, lower the sinker and button into to the water and record the new volume. Once the new volume is recorded, the original volume subtracted from the the new volume to devire the volume of the button. When determining the volume of several buttons, care must be taken not to loose any of the water from the graduated cylinder. In addition, the same weight must be used each time a button is submerged (control of a variable) since the volume may differ between one weight and another.

Science Processes.

1. Observing and classifying.
2. Gathering and recording data.
3. Measuring.
4. Manipulating data.
5. Controlling variables.
6. Evaluating data.
7. Logical thinking.

Math Skills.

1. Counting.
2. Sorting.
3. Recording data.
4. Comparing.
5. Measuring length.
6. Computing area.

Materials.

1. A random collection of buttons; approximately 5 buttons per student.
2. One centimeter or other ruler for each student (rulers may be omitted for kindergarten students).
3. One pencil for each student.
4. Four or five sheets of paper for each group of students (3 - 4 students per group; may be omitted for kindergarten students).
5. One or more Apple IIe or GS computers, one with a printer.
6. One AppleWorks startup and program disk for each computer.
7. One blank floppy computer disk for each computer.
8. For volume derivations, one, 100ml graduated cylinder for each group.
9. One spool of thread.
10. One fishing sinker or washer foe each group (volume computation).

Partial List of Variables.

1. Shape; round square, rectangular, oblong, triangular.
2. Color.
3. Number (in the sequence - 1, 2, 3 etc.).
4. Number of holes per button.
5. Diameter.
6. Length.
7. Width.
8. Thickness.
9. Volume (may be used with high school sudents, TAG students and adults - requires a water emersion to derive).
10. Surface area.
11. Texture.

Procedures.

1. Divide the class into groups of 3 to 4 students each.
2. Give each student a ruler and a pencil.
3. Give each group of students four sheets of paper.
4. Give each group a random collection of buttons, approximately 5 buttons per student.
5. Allow students 10 minutes to see what they can discover about the buttons.
6. Conduct a class brainstorming session (about 5 minutes) during which students make suggestions regarding what can be learned about the buttons they have, using their own skills and a ruler. List student suggestions on the chalkboard. The discussion should be guided so that the list includes those variables listed above.
7. Allow the students approximately 10 minutes to gather data about their buttons. Each student gathers data

about his or her own buttons.

8. Have students share their data so that all students in a group have all of the group's data.
9. For older students, conduct a second brainstorming session, in which, students make suggestions about how to organize the dada as it is gathered. Suggest students develop a form similar to the one that accompanies this activity.
10. Allow approximately 5 minutes to organize data.
11. Load the AppleWorks program into to the computer. The teacher may need to do this for younger students.
12. Format the blank floppy disk. Teachers may need to do this for younger students.
13. Construct a new data base file. Include variables in the file from the brainstorming session and the data table if applicable. To accomplish this task, the directions seen on the screen must be followed.
14. Enter the data gathered during the data gathering session into the file (the file will have a record for each button).
15. Store the file.
16. Print the file.
17. Manipulate the file various ways using the OPEN-APPLE and "A" keys option.
18. Print each new arrangement.
19. Allow students a period to examine data trends evidenced as a result of the computer data manipulations.

Curriculum Extension.

1. Write a report of the investigation using the AppleWorks word processing subprogram and the computer.
2. Write a story about the project using the computer.
3. Write a letter to a friend about the project. The letter is composed while using the computer.

DATA COLLECTION TABLE

ITEM NO.	SHAPE	COLOR	HOLES	DIAMETER	LENGTH	THICKNESS	VOLUME	SURFACE AREA	TEXTURE	OTHER

DEVELOPING DATA BASE FILES USING THE APPLEWORKS DATA BASE SUBPROGRAM AND APPLE IIe OR GS COMPUTERS

INTRODUCTION

"Developing Data Base Files Using The AppleWorks...Computers" was developed for use as a "how to" training device. It can be used with either Apple IIe or IIGS computers which have a Duodisk or two disk drives and an 80 column card installed. Its development was accomplished using an Apple Duodisk drive, 5 1/4" floppy disks, and the 1.3 Version of the AppleWorks program. Generally, other versions of the AppleWorks program as well as the smaller disk drives, presently available on the market, may be used in conjunction with the document. If the document is to be used as it was intended at the time of its development, users must have the following items available to them:

1. Apple II series computer.

2. A Duodisk drive or two disk drives (a single disk drive may be used).

3. AppleWorks startup and AppleWorks program disks. These items may be located on opposite sides of the same computer disk.

4. One data disk.

The following skills must be mastered by users before the document can be used as it was intended. Users must be able to:

1. Turn on the Apple computer.

2. Identify the location of slots 1 and 2 of the Duodisk drive or the difference between drives 1 and 2 of some other drive arrangement.

3. Bootup the AppleWorks program.

4. Format blank data disks (blank, unused disks must be formatted before information can be stored on them). This task may be accomplished using the AppleWorks program "Main Menu" option 5 (Other Activities) and option 5 of the "Other Activities" menu.

After building a file like the one described in this document, users should be able to set up data base files like the one described herein. Once a data base file, like the one described, has been constructed and saved on a data disk users should attempt to modify the file such that it will better fit their individual needs. Additional guidance in this regard may be found in the AppleWorks manual which accompanies the purchase of the program. Manuals are also available from many bookstores.

Mistakes found in this document are mine.

RMS

STEPS DIRECTIONS

01. Load the AppleWorks program into the computer. With this task completed, your screen should look like Figure 1 (the "Main Menu" is on the screen). In the upper left corner of the screen, you should find the numeral "2" following the second word "Disk." If this is the case, proceed to step 02. If the numeral is "1," go to step number 05.

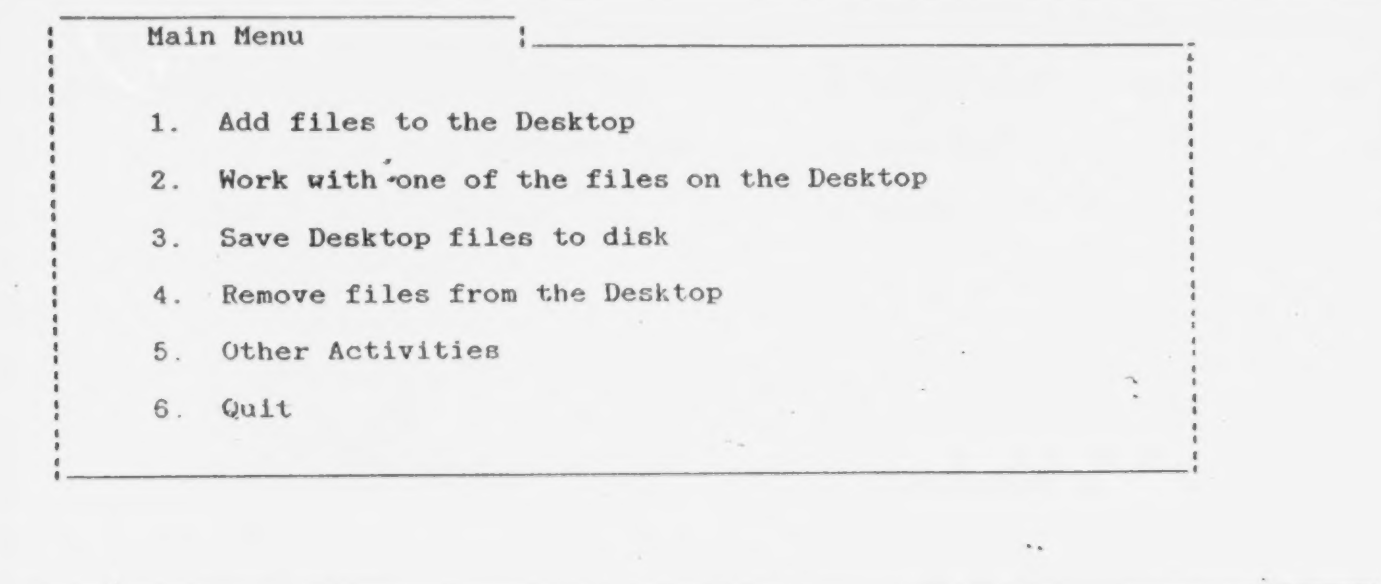
Disk: Disk 2
MAIN MENU
Main Menu
1. Add files to the Desktop
2. Work with one of the files on the Desktop
3. Save Desktop files to disk
4. Remove files from the Desktop
5. Other Activities
6. Quit
Type number, or use arrows, then press Return
@-? for Help

Figure 1. The Computer Screen With Disk Drive Two Selected.

02. Option #1, "Add Files to the Desktop" is high lighted (usually in green, but the actual color depends on the type of equipment you have) so you should press the RETURN key once. Your screen should look like the picture shown in Figure 2 following this action.

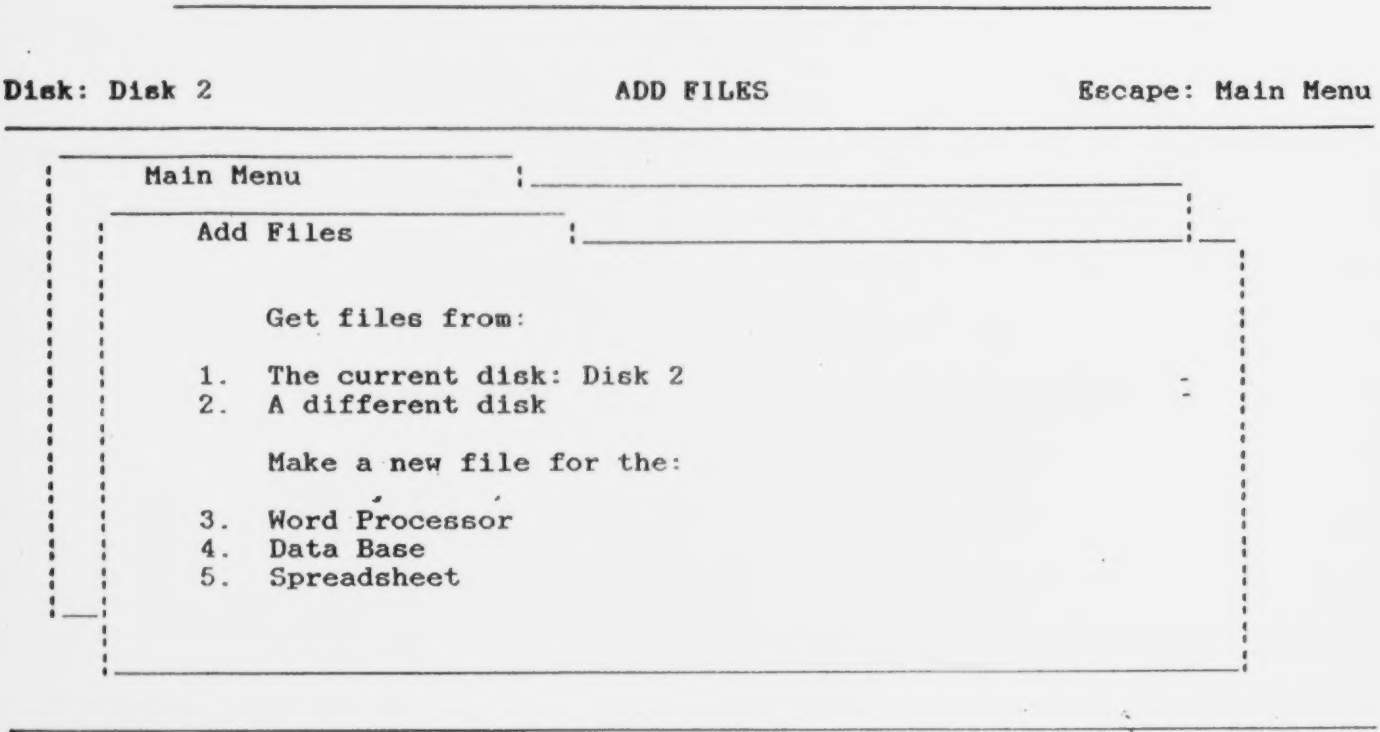

Figure 2. The Screen After Selecting, the "Add File to the Desktop" Option.

03. Press the numeral "4" key and then press the RETURN key once. This action should bring you to the "Data Base" menu and the screen will appear as does the picture in Figure 3.

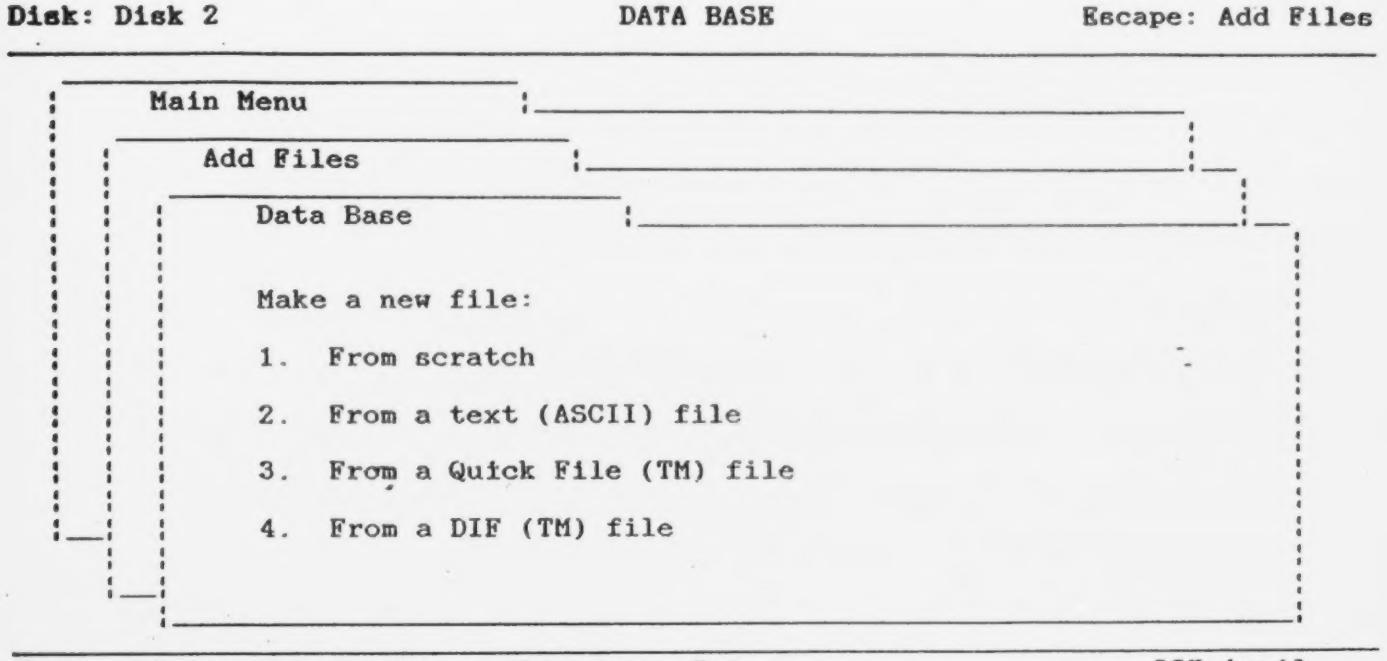

Figure 3. The "Data Base" Menu.

04. If you have successfully reached this point, jump to step 08.

05. If the screen looks like the picture shown in Figure 4 (note the #1 in the upper left corner of the Figure), select option #2, "A different disk," from the "Main Menu" by pressing DOWN ARROW once followed by RETURN once. As a result of this action, the screen should shift so that it appears like the picture shown in Figure 5.

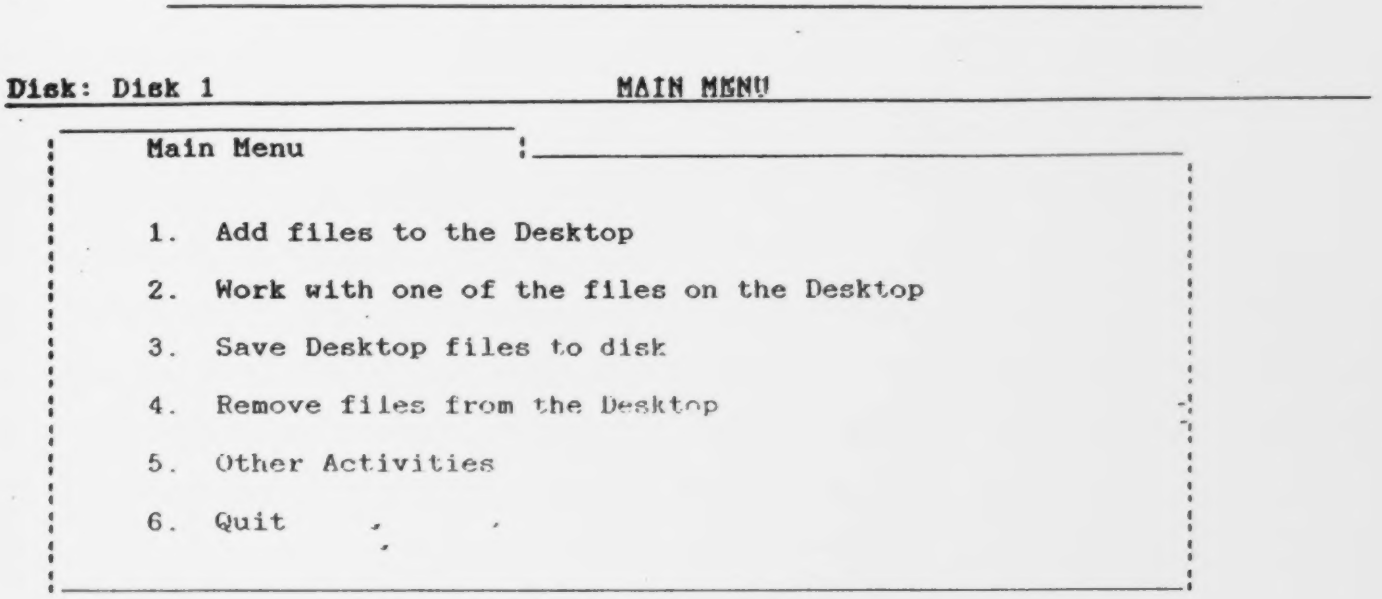
Disk: Disk 1
MAIN MENU
Main Menu
1. Add files to the Desktop
2. Work with one of the files on the Desktop
3. Save Desktop files to disk
4. Remove files from the Desktop
5. Other Activities
6. Quit
Type number, or use arrows, then press Return
@-? for Help

Figure 4. Computer Screen With "Disk: Disk 1" Selected.

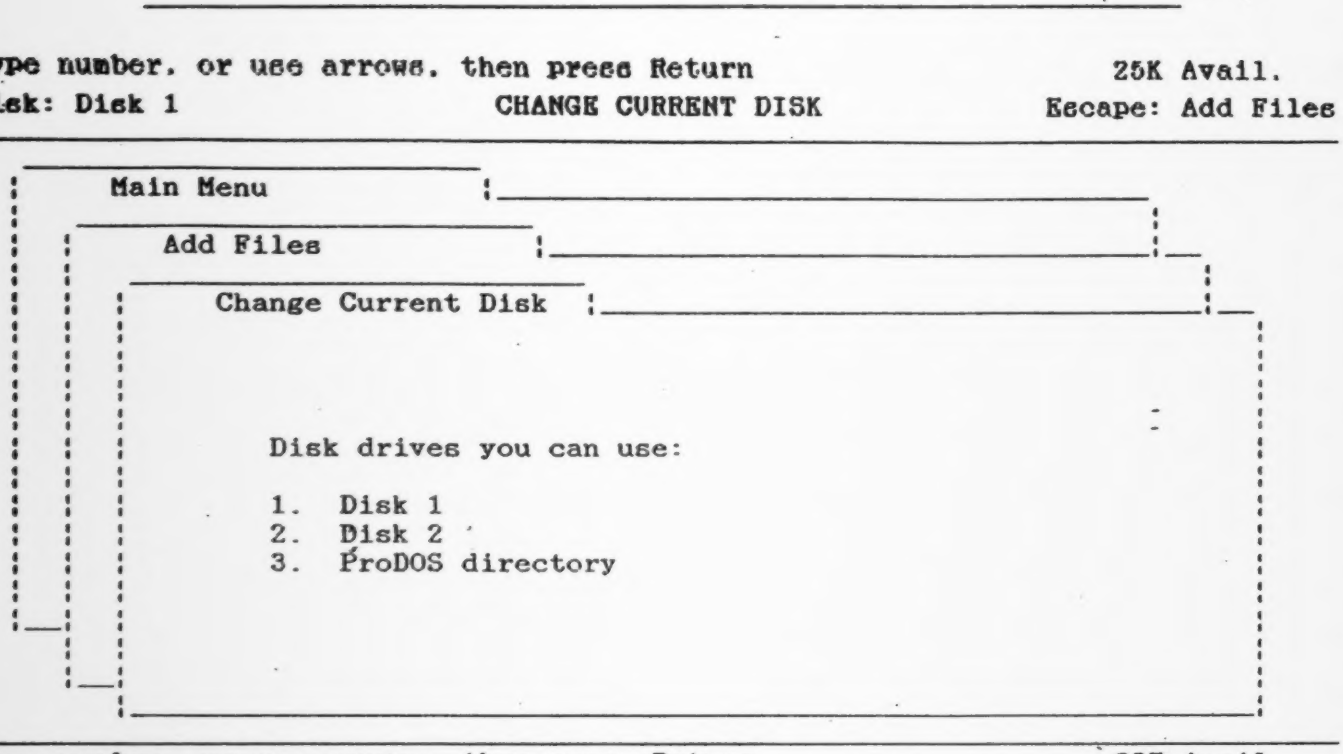

Figure 5. The Screen After Choosing, "A different disk" Option.

06. Select option #2, "Disk 2" by pressing DOWN-ARROW once followed by RETURN once. The screen should have changed following this action and now appear as it does Figure 2.

07. Now, complete step 03 and then jump to step 08.

08. With the screen appearing as it does in Figure 3 select option #1 (it is high lighted),"From scratch" by pressing RETURN once. The picture you see on the screen will change so that it looks like the one shown in Figure 6 below.

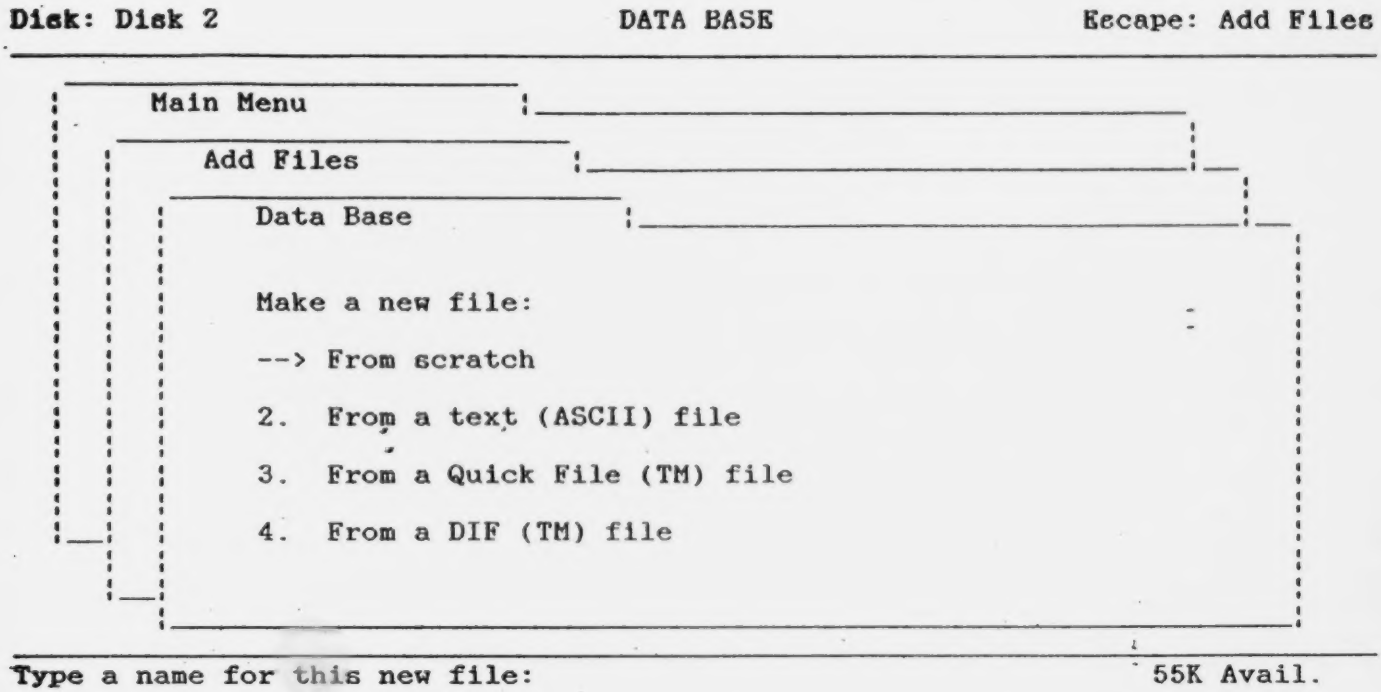

Figure 6. The Screen Showing The "From Scratch" Option Of The "Data Base" Menu Selected.

09. Directions at the bottom of the screen tell us to name the the new file so type the word "BUTTONS" (or some other name). The screen will now be identical to the picture shown in Figure 7.

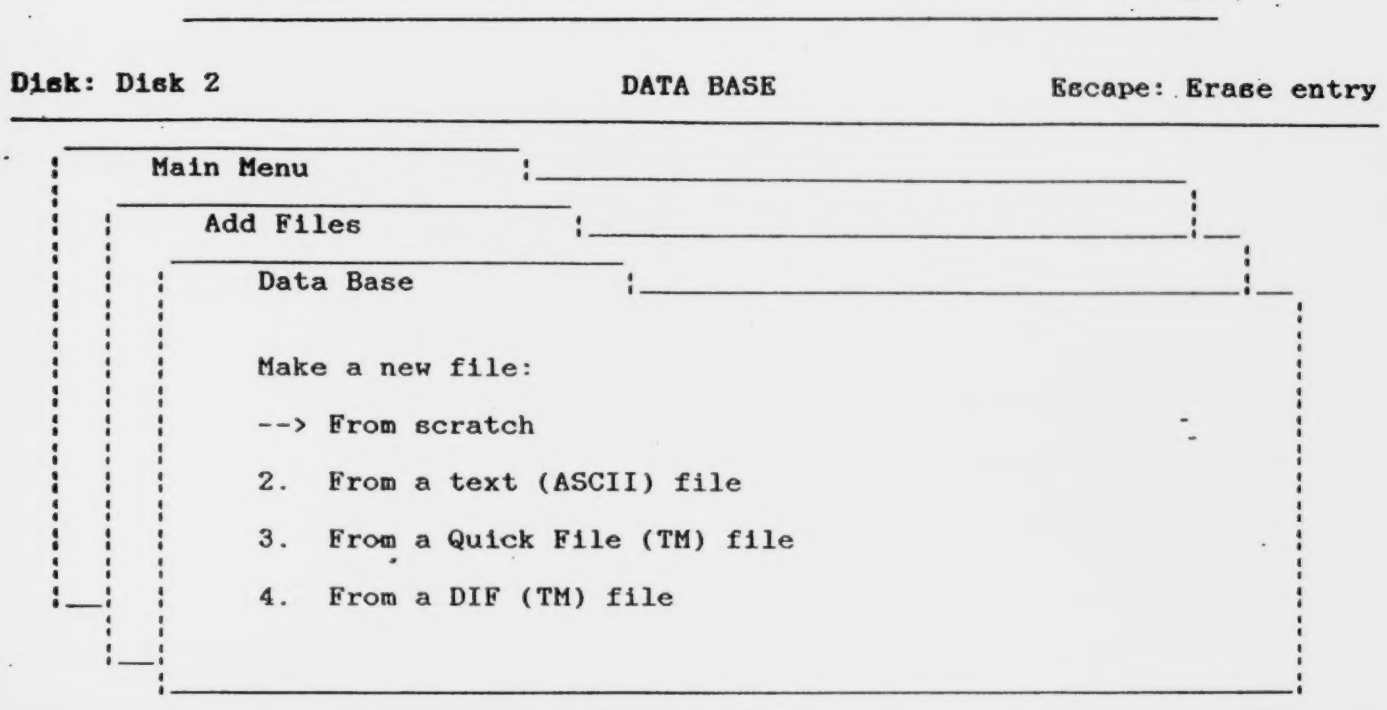

Figure 7. The Computer Screen After Naming The File.

10. Press the RETURN key once. The screen should look like the picture shown in Figure 8.

```
File: BUTTONS                CHANGE NAME/CATEGORY     Escape: Review/Add/Change

Category names
================================================================================
Category 1                                  |
                                            | Options:
                                            |
                                            | Change category name
                                            | Up arrow   Go to filename
                                            | Down arrow Go to next category
                                            | @-I        Insert new category
                                            |
                                            |
                                            |
                                            |
                                            |
--------------------------------------------------------------------------------
Type entry or use @ commands                                        55K Avail.
```

Figure 8. The Computer Screen Showing The Basic Data Base File Prior To The Insertion Of Category Names.

11. Insure that you are using the blinking block cursor and not the blinking line cursor. If the monitor screen shows a blinking line cursor, press the OPEN-APPLE and "E" keys at the same time to switch to the blinking block cursor (to switch back to the blinking block cursor, press the OPEN-ARROW and "E" keys at the same time).

12. Insert the first category name. This is accomplished as follows:

a. Press the CAPS-LOCK key down so that the machine will type only capital letters.

b. Type "SHAPE," (this data base will contain date derived from a random collection of buttons).

c. Press the SPACE-BAR several times to erase the remaining letters and numeral in the original "Category 1."

d. Press the RETURN key once. The screen should look like Figure 9.

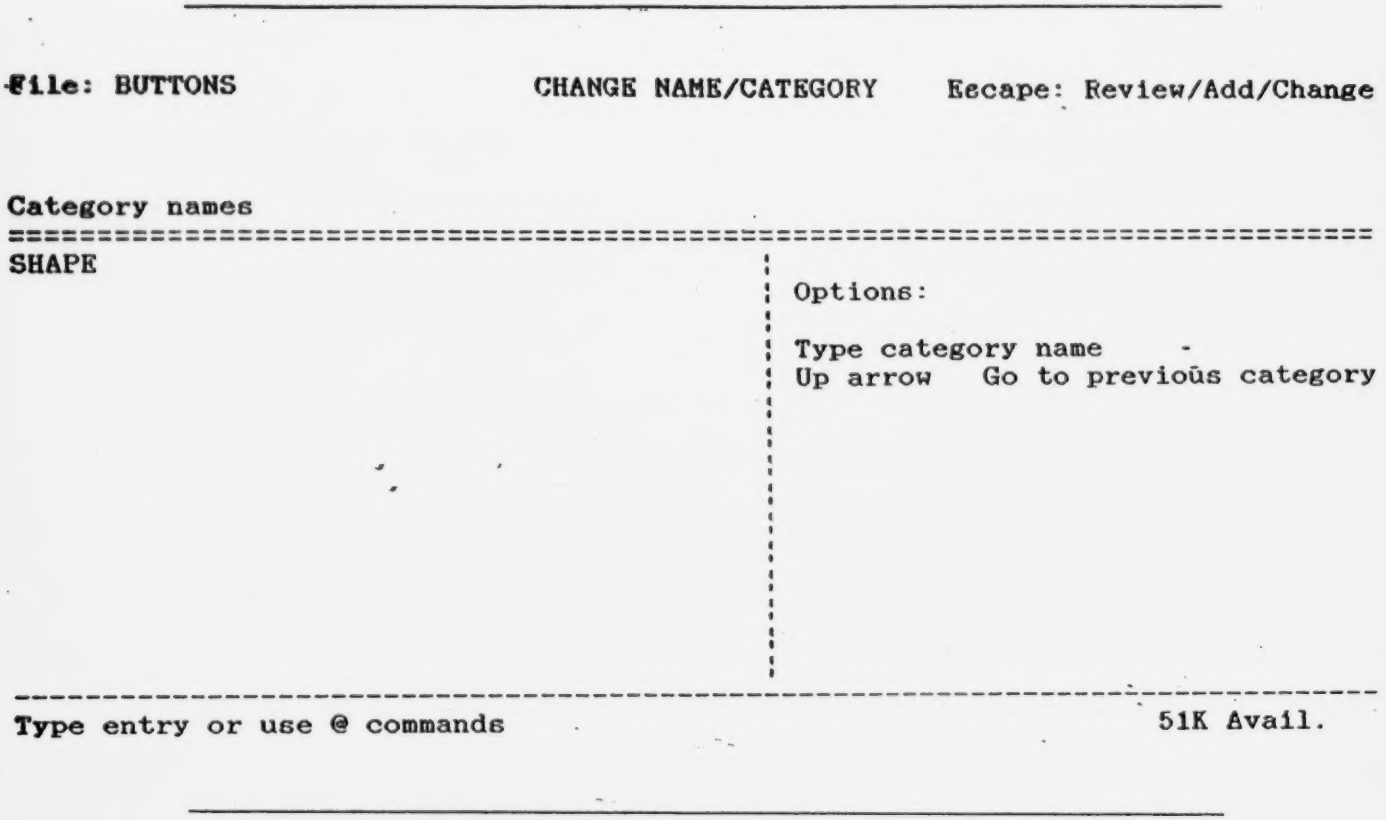

Figure 9. The Computer Screen After Inserting The "SHAPE category.

13. Type, "COLOR," and then press the RETURN key once.

14. Insert the following additional categories "COLOR, NUMBER, THICKNESS, TEXTURE, DIAMETER, LENGTH, WIDTH HOLES, AREA, VOLUME." Press the RETURN key once after typing each category name as was done above in step #13. The screen should look like the picture in Figure 10. At this point, the cursor is located on the line below "VOLUME."

```
File: BUTTONS                    CHANGE NAME/CATEGORY    Escape: Review/Add/Change

Category names
================================================================================
SHAPE                          |
COLOR                          | Options:
NUMBER                         |
THICKNESS                      | Type category name
TEXTURE                        | Up arrow   Go to previous category
DIAMETER                       |
LENGTH                         |
WIDTH                          |
HOLES                          |
AREA                           |
VOLUME                         |
                               |
--------------------------------------------------------------------------------
Type entry or use @ commands                                        54K Avail.
```

Figure 10. The Computer Screen After Typing The Eleven Category Names.

15. Press the ESC (escape) key once. The screen now looks like the picture shown in Figure 11.

```
File: BUTTONS                REVIEW/ADD/CHANGE              Escape: Main Menu

Category names
================================================================================

                    This file does not yet contain
                    any information.  Therefore, you
                    will automatically go into the
                    Insert New Records feature.




--------------------------------------------------------------------------------
Press Space Bar to continue                                          51K Avail.
```

Figure 11. The Monitor Screen After Performing Step 15.

16. Press the SPACE-BAR once. The screen changes so that it appears like the screen shown in Figure 12 and the file is ready for the insertion of real data.

```
File: BUTTONS                    INSERT NEW RECORDS      Escape: Review/Add/Change


Record 1 of 1
================================================================================
SHAPE: -
COLOR: -
NUMBER: -
THICKNESS: -
TEXTURE: -
DIAMETER: -
LENGTH: -
WIDTH: -
HOLES: -
AREA: -




--------------------------------------------------------------------------------
Type entry or use @ commands                                        51K Avail.
```

Figure 12. The Computer Screen Showing A Blank "Record 1 of 1".

17. Insert data in the first record. This accomplished as follows:

    a. Type the information to be entered in a category.

    b. Press the RETURN key once.

c. Type information in the next category and press the RETURN key once. After inserting data in all categories, your screen should be similar to the picture shown in Figure 13.

```
File: BUTTONS                    REVIEW/ADD/CHANGE                    Escape: Main Menu

Selection: All records

Record 1 of 2
================================================================================
SHAPE: Round
COLOR: Blue
NUMBER: 10
THICKNESS: 4mm
TEXTURE: Smooth
DIAMETER: 2.5cm
LENGTH: NA
WIDTH: NA
HOLES: 4
AREA: 4.91sqcm
VOLUME: 1.96cucm




--------------------------------------------------------------------------------
Type entry or use @ commands                                        @-? for Help
```

Figure 13. The Computer Screen Showing Record 1 Following The Insertion Of Data.

d. Use the UP-ARROW key after pressing the RETURN key to return to a category where a mistake has been made.

e. If the computer does not move automatically from record 1 to record 2 after data has been inserted in the last category (VOLUME) follow the directions provided on the monitor screen.

18. After inserting information in the first record, press the OPEN-APPLE and the "Z" (zoom) keys at the same time. The screen will now appear similar to the example provided in Figure 14 (if you want to return to the original format, press the OPEN-APPLE and the "Z" again).

File: BUTTONS REVIEW/ADD/CHANGE Escape: Main Menu

Selection: All records

SHAPE	COLOR	NUMBER	THICKNESS	TEXTURE
Round	Blue	10	4mm	Smooth
-	-	-	-	-

Type entry or use @ commands @-? for Help

Figure 14. The Computer Screen After Entering Data In The First Record And Switching Screen Formats.

19. Press the OPEN-APPLE and the "L" (layout) keys at the same time. This action will allow changes in the column widths and the like to be made. See Figure 15.

```
File: BUTTONS                CHANGE RECORD LAYOUT     Escape: Review/Add/Change

================================================================================

                --> or <--   Move cursor
                 >  @   <    Switch category positions
                --> @  <--   Change column width
                @-D          Delete this category
                @-I          Insert a previously deleted category

--------------------------------------------------------------------------------

SHAPE           COLOR          NUMBER         THICKNESS       TEXTURE
--------------- -------------- -------------- --------------- ---------------
Round           Blue           10             4mm             Smooth


-------------------------------------------------------------------- More --->
Use options shown above to change record layout                  ~51K Avail.
```

Figure 15. The Computer Screen After Selecting The Alter Layout Option.

20. Alter the file to fit your desires by following the directions provided on the screen. Figure 16 is an example of an altered file.

File: BUTTONS CHANGE RECORD LAYOUT **Escape:** Review/Add/Change

==========

--> or <--	Move cursor
> @ <	Switch category positions
--> @ <--	Change column width
@-D	Delete this category
@-I	Insert a previously deleted category

SHAPE	COLOR	NUMBER	THICKNESS	TEXTURE	DIAMETER	LENGTH	WIDTH	HOLES	AREA	VOLUME
Round	Blue	10	4mm	Smooth	2.5cm	NA	NA	4	4.91sqc	1.96cu

---- More --->

Use options shown above to change record layout 51K Avail.

Figure 16. Example Of An Altered File.

21. Press the ESC key once. The screen will appear similar to the example shown in Figure 17.

```
File: BUTTONS                    CHANGE RECORD LAYOUT     Escape: Review/Add/Change

================================================================================

                    What direction should the cursor
                    go when you press Return?

                          1.  Down (standard)
                          2.  Right

--------------------------------------------------------------------------------

SHAPE COLOR NUMBER THICKNESS TEXTURE DIAMETER LENGTH WIDTH HOLES AREA    VOLUME
----- ----- ------ --------- ------- -------- ------ ----- ----- ------- ------
Round Blue  10     4mm       Smooth  2.5cm    NA     NA    4     4.91sqc 1.96cu


--------------------------------------------------------------------- More --->
Type number, or use arrows, then press Return                      51K Avail.
```

Figure 17. The Computer Screen After Pressing ESC Once.

22. Press the ESC key once (a second time). The monitor screen changes to appear similar to the example in Figure 18.

File: BUTTONS REVIEW/ADD/CHANGE **Escape:** Main Menu

Selection: All records

SHAPE	COLOR	NUMBER	THICKNESS	TEXTURE	DIAMETER	LENGTH	WIDTH	HOLES	AREA	VOLUME
Round	Blue	10	4mm	Smooth	2.5cm	NA	NA	4	4.91sqc	1.96cu
-	-	-	-	-	-	-	-	-	-	-

Type entry or use @ commands @-? for Help

Figure 18. The Monitor Screen Showing The Altered Data Base file.

23. Press the OPEN-APPLE and the "S" keys at the same time to save the file on a the data disk in slot or drive two.

24. Return to the "Main Menu" by pressing the ESC key once. The Screen now should be identical to the picture shown in Figure 19.

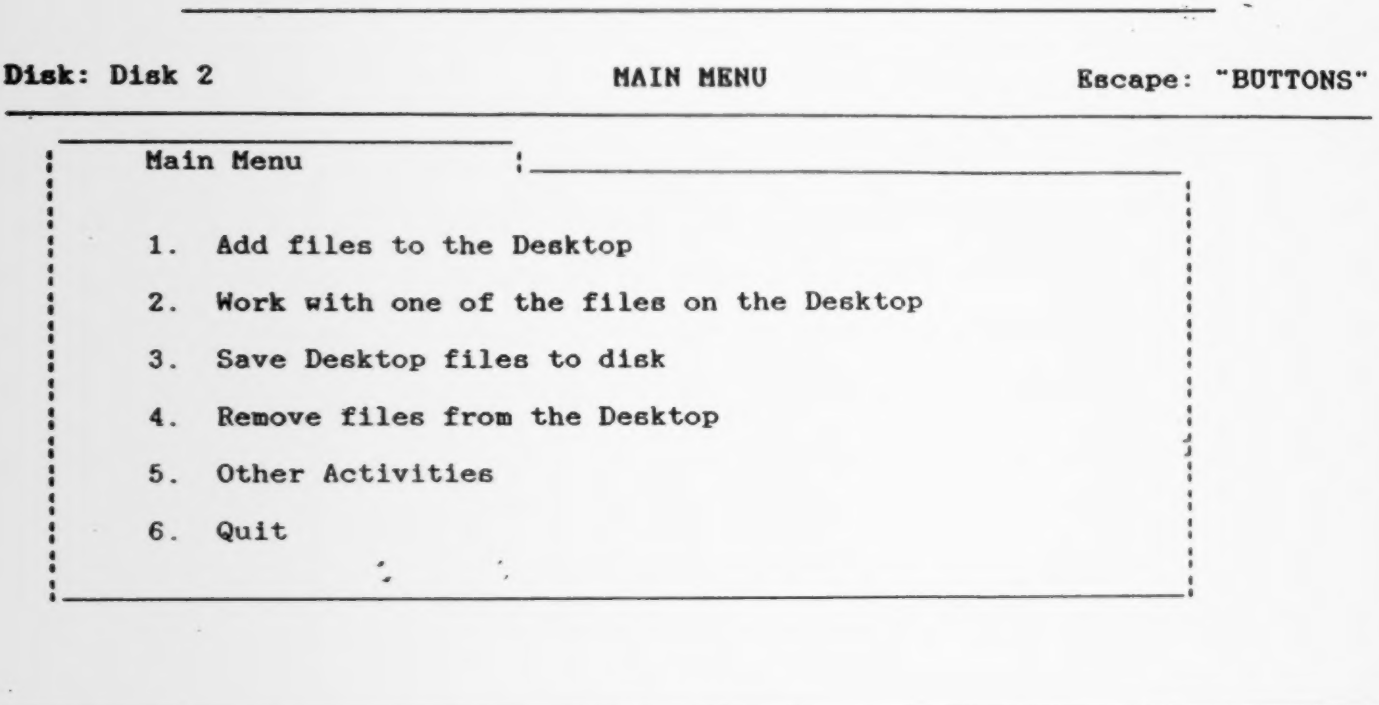
Disk: Disk 2
MAIN MENU
Escape: "BUTTONS"
Main Menu
1. Add files to the Desktop
2. Work with one of the files on the Desktop
3. Save Desktop files to disk
4. Remove files from the Desktop
5. Other Activities
6. Quit
Type number, or use arrows, then press Return
@-? for Help

Figure 19. "Main Menu."